PATENT ABSTRACTS OF JAPAN

(11)Publication number : **2001-033484**
(43)Date of publication of application : **09.02.2001**

(51)Int.Cl. G01R 1/073
H01L 21/66

(21)Application number : **11-201789**
(22)Date of filing : **15.07.1999**

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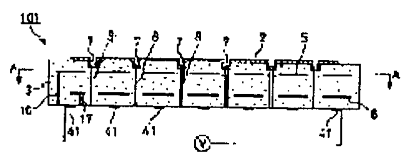
(54) WAFER PROBER

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a light weight, excellent temperature rising and falling characteristics, no warp even when a probe card is pressed and to effectively prevent a damage or a measuring miss of a silicon wafer by providing a conductor layer at ceramics having high rigidity as a chuck top conductor layer.
SOLUTION: In the wafer prober 10, concentrically circular grooves 1 are formed on a surface of a ceramic board 3 in a circular shape as seen in plane, a plurality of suction holes 8 for sucking a silicon wafer are provided partly in the grooves 7, and a chuck top conductor layer 2 for connecting electrodes of the wafer to most portion of the board 3 including the grooves 1 is formed in a circular shape. A heater 41 of concentrically circular shape as seen in plane is provided to control a temperature of the wafer in a bottom of the board 3, external terminal pins are fixedly connected to both ends of the heater 41. Further, guard electrodes 5 and ground electrodes 6 for removing a stress capacitor or a noise are provided in the board 3.



LEGAL STATUS

[Date of request for examination] 04.09.2000

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

CLAIMS

[Claim(s)]
[Claim 1] The wafer prober which a conductor layer is formed in the front face of a ceramic substrate, and is characterized by the bird clapper.
[Claim 2] The aforementioned conductor layer is a wafer prober according to claim 1 which is a chuck top conductor layer.
[Claim 3] The wafer prober according to claim 1 or 2 which comes to prepare a temperature-control means in the aforementioned ceramic substrate.
[Claim 4] The aforementioned ceramic substrate is a wafer prober given in any 1 of the claims 1-3 which are at least one sort chosen from the ceramic belonging to a nitride ceramic, a carbide ceramic, and an oxide ceramic.
[Claim 5] The aforementioned temperature-control means is a wafer prober given in any 1 of the claims 1-4 which are the Peltier elements.
[Claim 6] The aforementioned temperature-control means is a wafer prober given in any 1 of the claims 1-5 which are heating elements.
[Claim 7] A wafer prober given in any 1 of the claims 1-6 which come to form the conductor layer of at least one or more layers into the aforementioned ceramic substrate.
[Claim 8] A wafer prober given in any 1 of the claims 1-7 which come to form a slot in the front face of the aforementioned ceramic substrate.
[Claim 9] a slot forms in the front face of the aforementioned ceramic substrate -- having -- the slot -- suction of air -- a wafer prober given in any 1 of the claims 1-8 to which it comes to form a hole
[Claim 10] The aforementioned conductor layer is a wafer prober according to claim 1 which is a porosity object.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] About the wafer prober mainly used in semiconductor industry, especially, this invention is thin, is light and relates to the wafer prober which is excellent in a temperature up temperature fall property.
[Detailed description]
[0002]
[Description of the Prior Art] A semiconductor is a very important product needed in various industries, and a semiconductor chip is manufactured by forming various circuits etc. in this silicon wafer, after slicing a silicon single crystal in predetermined thickness and producing a silicon wafer. In the manufacturing process of this semiconductor chip, the probing process which measures and confirms whether the electrical property operates as a design is required of the stage of a silicon wafer, and, for the reason, the so-called prober is used.
[0003] As such a prober, the wafer prober which has the metal chuck top of an aluminium alloy, stainless steel, etc. is indicated by for example, the patent No. 2587289 official report, JP,3-40947,B, and JP,11-31724,A (refer to drawing 13). In such a wafer prober, laying a silicon wafer on a wafer prober, pushing the probe card which has a circuit tester pin in this silicon wafer, and heating and cooling for example, as shown in drawing 12 , voltage is impressed and a continuity test is performed.
[0004]
[Problem(s) to be Solved by the Invention] However, there were the following problems in the wafer prober which has such the metal chuck top. First, since it is metal, you have to thicken the chuck top's thickness with about 15mm. Thus, the chuck top is thickened because the silicon wafer which the chuck top is pushed by the circuit tester pin of a probe card, and curvature and distortion occur in the chuck top's metal plate in a thin metal plate, and is laid on a metal plate damages, or inclines and carries out. For this reason, although it is necessary to thicken the chuck top consequently, the chuck top's weight will become large and it will be bulky.
[0005] Moreover, if a temperature up and a temperature fall property are bad, it is hard to carry out a temperature control and a silicon wafer is laid at an elevated temperature since the temperature of a chuck top board does not follow quickly to change of voltage or the amount of current in spite of using the metal with high thermal conductivity, it will become temperature-control impotentia.
[0006] The invention in this application does not have curvature, when it is lightweight, it excels in the temperature up and the temperature fall property and a probe card is moreover pressed in view of the above-mentioned technical problem, and it aims at offering the wafer prober which can prevent breakage and a measurement mistake of a silicon wafer effectively.
[0007]
[Means for Solving the Problem] This invention persons found out that the wafer prober which curvature does not generate even if it makes it thin was obtained by replacing with the metal chuck top, preparing a conductor layer in a rigid high ceramic, and making this into a chuck top conductor layer, as a result of inquiring wholeheartedly, in order to solve the above-mentioned technical problem.
[0008] furthermore, in the wafer prober which has the metal chuck top In spite of using the metal with high thermal conductivity, that a temperature up and a temperature fall property become bad While tracing that it is because the thickness of a metal plate is too thick and heat capacity becomes large Even if thermal conductivity was inferior to the metal by using a ceramic, thickness could be made thin and heat capacity could be made small, and it hits on an idea in the new technical thought completely contrary to the conventional common sense that a temperature up and a temperature fall property are improvable, and came to complete this invention.
[0009] That is, this invention is a wafer prober which a conductor layer (chuck top conductor layer) is formed in the front face of a ceramic substrate, and is characterized by the bird clapper. In the above-mentioned wafer prober, it is desirable to prepare the temperature-control means in this above-mentioned ceramic substrate.
[0010] Moreover, as for the above-mentioned ceramic substrate, in the above-mentioned wafer prober, it is desirable that it is at least one sort chosen from the ceramic belonging to a nitride ceramic, a carbide ceramic, and an oxide ceramic. Moreover, as for the above-mentioned temperature-control means, it is desirable that it is the Peltier element or is a heating element.
[0011] Moreover, it is desirable that the conductor layer of at least one or more layers is formed, and it is in the

above-mentioned ceramic substrate in the above-mentioned wafer prober again, and it is desirable to form the slot in the front face of the above-mentioned ceramic substrate. moreover, a slot forms in the front face of the above-mentioned ceramic substrate -- having -- the slot -- suction of air -- it is desirable to form the hole

[0012]

[Embodiments of the Invention] In the wafer prober of this invention, a conductor layer (chuck top conductor layer) is formed in the front face of a ceramic substrate, and it is characterized by the bird clapper. Hereafter, a conductor layer is made a chuck top conductor layer. In this invention, since the substrate which consists of a rigid high ceramic is used, even if the chuck top is pushed by the circuit tester pin of a probe card, the chuck top does not curve and the chuck top's thickness can be made small compared with a metal.

[0013] Moreover, since the chuck top's thickness can be made small compared with a metal, even if thermal conductivity is a low ceramic from a metal, heat capacity becomes small as a result, and a temperature up and a temperature fall property can be improved.

[0014] Drawing 1 is the cross section having shown typically 1 operation gestalt of the wafer prober of this invention, drawing 2 is the plan, drawing 3 is the bottom plan view, and drawing 4 is an A-A line cross section in the wafer prober shown in drawing 1 .

[0015] two or more suction for attracting a silicon wafer into a part of slot 7 in this wafer prober, while the slot 7 of a concentric circle configuration is formed in the front face of the ceramic substrate 3 of a plane view circle configuration -- the hole 8 is formed and the chuck top conductor layer 2 for connecting with the electrode of a silicon wafer at most ceramic substrates 3 including a slot 7 is formed in the circle configuration

[0016] On the other hand, in the base of the ceramic substrate 3, the heating element 41 of a plane view concentric circle configuration in order to control the temperature of a silicon wafer, as shown in drawing 3 is formed, the external terminal pin 191 is connected and fixed to the ends of a heating element 41, and in order to remove a stress capacitor and a noise, guard electrodes 5 and the grand electrode 6 are formed in the interior of the ceramic substrate 3.

[0017] The wafer prober of this invention has composition as shown in drawing 1 -4. It will explain to a detail one by one about other operation gestalten of each part material which constitutes the above-mentioned wafer prober below, and the wafer prober of this invention.

[0018] As for the ceramic substrate used by the wafer prober of this invention, it is desirable that it is at least one sort chosen from the ceramic belonging to a nitride ceramic, a carbide ceramic, and an oxide ceramic.

[0019] As the above-mentioned nitride ceramic, a metal nitride ceramic, for example, alumimium nitride, silicon nitride, boron nitride, a titanium nitride, etc. are mentioned. Moreover, as the above-mentioned carbide ceramic, a metal carbide ceramic, for example, silicon carbide, a zirconium carbide, a titanium carbide, a tantalum carbide, a carbonization wardrobe ten, etc. are mentioned.

[0020] As the above-mentioned oxide ceramic, a metallic-oxide ceramic, for example, an alumina, a zirconia, a cordierite, a mullite, etc. are mentioned. These ceramics may be used independently and may use two or more sorts together.

[0021] In these ceramics, a nitride ceramic and the carbide ceramic are more desirable compared with an oxide ceramic. It is because thermal conductivity is high. Moreover, in a nitride ceramic, alumimium nitride is the most suitable. It is because thermal conductivity is as the highest as 180 W/m-K. It is desirable to include 200-1000 ppm of carbon in the aforementioned ceramic. It is because the electrode pattern in a ceramic is concealed and high radiant heat is obtained. Carbon may be both a crystalline substance detectable by the X diffraction, or both [undetectable / undetectable one side or].

[0022] The thickness of of the chuck top ceramic substrate in this invention needs a thick thing, and its 1-10mm is specifically more desirable than a chuck top conductor layer. Moreover, in this invention, in order to use the rear face of a silicon wafer as an electrode, the chuck top conductor layer is formed in the front face of a ceramic substrate.

[0023] The thickness of the above-mentioned chuck top conductor layer has desirable 1-20 micrometers. It is because it will become easy to exfoliate with the stress which a conductor has in less than 1 micrometer if resistance becomes high too much, and does not work as an electrode but exceeds 20 micrometers on the other hand.

[0024] As a chuck top conductor layer, at least one sort of metals chosen from refractory metals, such as copper, titanium, chromium, nickel, noble metals (gold, silver, platinum, etc.), a tungsten, and molybdenum, can be used, for example. A CHAP conductor layer may be a porosity object which consists of a metal or a conductive ceramic. It is not necessary to form the slot for suction adsorption which is mentioned later and, in the case of a porosity object, not only can prevent breakage of the wafer on the grounds that existence of a slot, but it is because uniform suction adsorption is realizable on the whole front face. A metal sintered compact can be used as such a porosity object. Moreover, when a porosity object is used, the thickness can be used by 1-200 micrometers. The junction to a porosity object and a ceramic substrate uses solder and brazing filler metal.

[0025] It is desirable that it is a thing containing nickel as a chuck top conductor layer. A degree of hardness is high and it is the shell which cannot carry out deformation etc. easily to press of a circuit tester pin. As concrete composition of a chuck top conductor layer, a nickel sputtering layer is formed first and what prepared the non-electrolyzed nickel-plating layer on it, the thing which sputtering of titanium, molybdenum, and the nickel was carried out [thing] in this sequence, and deposited nickel with electroless plating or electrolysis plating on it further are mentioned, for example.

[0026] Moreover, sputtering of titanium, molybdenum, and the nickel may be carried out in this sequence, and copper and nickel may be further deposited with electroless plating on it. It is because the resistance of a chuck top electrode can be reduced by forming a copper layer.

[0027] Furthermore, sputtering of titanium and the copper may be carried out in this order, and nickel may be further deposited with electroless plating or electroless plating on it. Moreover, it is also possible to have carried out sputtering of chromium and the copper in this order, and to have deposited nickel with electroless plating or electroless plating on it further.

[0028] The above-mentioned titanium and chromium can raise adhesion with a ceramic, and molybdenum can improve adhesion with nickel. The thickness of 0.5-7.0 micrometers and nickel has [the thickness of titanium and chromium / the thickness of 0.1-0.5 micrometers and molybdenum] desirable 0.4-2.5 micrometers.

[0029] It is desirable to form the noble-metals layer (gold, silver, platinum, palladium) in the front face of the above-mentioned chuck top conductor layer. A noble-metals layer is because contamination by the migration of base metal can be prevented. Noble-metals layer thickness has desirable 0.01-15 micrometers.

[0030] In this invention, it is desirable to prepare a temperature-control means in a ceramic substrate. It is because the continuity check of a silicon wafer can be performed heating or cooling.

[0031] Besides the heating element 41 shown in drawing 1 as the above-mentioned temperature-control means, you may be the Peltier element. When preparing a heating element, you may prepare the spray mouth of refrigerants, such as air, etc. as a cooling means. You may prepare a two or more layers heating element. In this case, the pattern of each class has the desirable state where were formed so that it might complement mutually, and the pattern was formed in some layer, in view of the heating surface. For example, it is the structure which is alternate arrangement mutually.

[0032] As a heating element, a metal or the sintered compact of a conductive ceramic, a metallic foil, a metal wire, etc. are mentioned, for example. As a metal sintered compact, at least one sort chosen from a tungsten and molybdenum is desirable. These metals are because it has sufficient resistance comparatively to be hard to oxidize and generate heat.

[0033] Moreover, as a conductive ceramic, at least one sort chosen from the carbide of a tungsten and molybdenum can be used. Furthermore, when forming a heating element in the outside of a ceramic substrate, as a metal sintered compact, it is desirable to use noble metals (gold, silver, palladium, platinum) and nickel. Specifically, silver and silver-palladium etc. can be used. The metal particles used for the above-mentioned metal sintered compact can use the mixture of a globular shape, the shape of a piece of Lynn, and the shape of a spherical and a piece of Lynn.

[0034] In a metal sintered compact, you may add a metallic oxide. The above-mentioned metallic oxide is used for sticking a nitride ceramic or a carbide ceramic, and metal particles. Although the reason the adhesion of a nitride ceramic or a carbide ceramic, and metal particles is improved by the above-mentioned metallic oxide is not clear, the oxide film is formed slightly, these oxide films sinter and unify the front face of a metal-particles front face and a nitride ceramic, or a carbide ceramic through a metallic oxide, and it is thought that metal particles, a nitride ceramic, or a carbide ceramic will stick.

[0035] As the above-mentioned metallic oxide, at least one sort chosen from a lead oxide, a zinc oxide, a silica, boron oxide (B-2 O3), an alumina, a yttria, and a titania, for example is desirable. These oxides are because adhesion with metal particles, a nitride ceramic, or a carbide ceramic can be improved without enlarging the resistance of a heating element.

[0036] As for the above-mentioned metallic oxide, it is desirable that it is less than 10 % of the weight 0.1 % of the weight or more to metal particles. It is because resistance does not become large too much and adhesion with metal particles, a nitride ceramic, or a carbide ceramic can be improved.

[0037] moreover, the case where the rate of a lead oxide, a zinc oxide, a silica, boron oxide (B-2 O3), an alumina, a yttria, and a titania makes the whole quantity of a metallic oxide the 100 weight sections -- a lead oxide -- 1 - 10 weight section and a silica -- 20 - 70 weight section and an alumina have [1 - 10 weight section and a yttria / 1 - 50 weight section and a titania] one to 50 desirable [1 - 30 weight section and boron oxide] zinc oxide [5 However, it is desirable to be adjusted in the range in which these sum totals do not exceed the 100 weight sections. It is because especially these ranges are ranges which can improve adhesion with a nitride ceramic.

[0038] When preparing a heating element in the front face of a ceramic substrate, it is desirable to cover the front face of a heating element with the metal layer 410 (refer to drawing 11 (e)). A heating element is a sintered compact of metal particles, if it has exposed, it will be easy to oxidize, and resistance will change with these oxidization. Then, oxidization can be prevented by covering a front face with a metal layer.

[0039] Metal layer thickness has desirable 0.1-10 micrometers. It is because it is the range which can prevent oxidization of a heating element, without changing the resistance of a heating element. The metal used for covering should just be a metal of a non-oxidizing quality. Specifically, at least one or more sorts chosen from gold, silver, palladium, platinum, and nickel are desirable. Nickel is still more desirable especially. Although the terminal for connecting with a power supply is required for a heating element and this terminal is attached in a heating element through solder, nickel is because the thermal diffusion of solder is prevented. If it acts as an end-connection child, the terminal pin made from covar can be used. In addition, covering is unnecessary, in order that a heating element front face may not oxidize, when forming a heating element in the interior of a heater board. When forming a heating element in the interior of a heater board, a part of front face of a heating element may be exposed.

[0040] What carried out pattern formation of a nickel foil and the stainless steel foil by etching etc., and was used as the heating element as a metallic foil used as a heating element is desirable. You may stretch the patternized metallic foil with a resin film etc. As a metal wire, a tungsten line, a molybdenum line, etc. are mentioned, for example.

[0041] changing the direction where current flows, when using the Peltier element as a temperature-control means -- both generation of heat and cooling -- **** -- since things are made, it is advantageous As shown in drawing 7 , the Peltier element

connects p type and the n type thermoelement 440 in series, and is formed by joining this to the ceramic board 441 etc. As a Peltier element, a silicon germanium system, a bismuth antimony system, lead, tellurium system material, etc. are mentioned, for example.

[0042] It is desirable to form the conductive layer of at least one or more layers between a temperature-control means and a chuck top conductor layer in this invention. The guard electrodes 5 and the grand electrode 6 in drawing 1 are equivalent to the above-mentioned conductor layer. Guard electrodes 5 are electrodes for canceling the stress capacitor which intervenes in a measuring circuit, and the grounding potential of a measuring circuit (namely, chuck top conductor layer 2 of drawing 1) is given. Moreover, the grand electrode 6 is formed in order to cancel the noise from a temperature-control means. The thickness of these electrodes has desirable 1-20 micrometers. It is because a ceramic substrate will curve or thermal shock nature will fall, if too thick [if too thin, resistance will become high, and].

[0043] As for these guard electrodes 5 and the grand electrode 6, it is desirable to be prepared in the shape of [as shown in drawing 4] a grid. That is, it is the configuration to which much rectangle-like conductor-layer agenesis sections 52 align to the interior of the conductor layer 51 of a circle configuration, and exist in it. It considered as such a configuration for improving the adhesion of the ceramics of the conductor-layer upper and lower sides. the chuck top of the wafer prober of this invention -- a conductor -- it was shown in the stratification side at drawing 2 -- as -- suction of a slot 7 and air -- it is desirable to form the hole 8 suction -- two or more holes 8 are formed and uniform adsorption is achieved a silicon wafer W -- laying -- suction -- it is because air can be attracted from a hole 8 and a silicon wafer W can be made to adsorb

[0044] As a wafer prober in this invention, as shown in drawing 1 , a heating element 41 is formed in the base of the ceramic substrate 3, for example. As shown in the wafer prober 101 of composition of that the layer of guard electrodes 5 and the layer of the grand electrode 6 were prepared between the heating element 41 and the chuck top conductor layer 2, respectively, and drawing 5 , the heating element 42 of a flat configuration is formed in the interior of the ceramic substrate 3. As shown in the wafer prober 201 of composition of that guard electrodes 5 and the grand electrode 6 were formed between the heating element 42 and the chuck top conductor layer 2, and drawing 6 , the metal wire 43 which is a heating element is laid under the interior of the ceramic substrate 3. As shown in the wafer prober 301 of composition of that guard electrodes 5 and the grand electrode 6 were formed between the metal wire 43 and the chuck top conductor layer 2, and drawing 7 , the Peltier element 44 (it consists of a thermoelement 440 and a ceramic substrate 441) is formed in the outside of the ceramic substrate 3. The wafer prober 401 grade of composition of that guard electrodes 5 and the grand electrode 6 were formed between the Peltier element 44 and the chuck top conductor layer 2 is mentioned. any wafer prober -- a slot 7 and suction -- it surely has the hole 8

[0045] In this invention, since heating elements 42 and 43 are formed in the interior of the ceramic substrate 3 as shown in drawing 1 -7 (drawing 5 -6), and guard electrodes 5 and the grand electrode 6 (drawing 1 -7) are formed in the interior of the ceramic substrate 3, the connections (through hole) 16, 17, and 18 for connecting these and an external terminal are needed. Through holes 16, 17, and 18 are formed by being filled up with conductive ceramics, such as refractory metals, such as a tungsten paste and a molybdenum paste, tungsten carbide, and molybdenum carbide.

[0046] Moreover, the diameter of connections (through hole) 16 and 17 has 0.1-10 desirablemm. It is because a crack and distortion can be prevented, preventing an open circuit. An external terminal pin is connected by using this through hole as a connection pad (refer to drawing 11 (g)).

[0047] Connection is made by solder and brazing filler metal. As brazing filler metal, silver solder, a palladium wax, an aluminum wax, and a gold solder are used. As a gold solder, a Au-nickel alloy is desirable. A Au-nickel alloy is because it excels in adhesion with a tungsten.

[0048] The ratio of Au/nickel has desirable [81.5-82.5(% of the weight)]/[18.5-17.5 (% of the weight)]. Au-nickel layer thickness has desirable 0.1-50 micrometers. It is because it is sufficient range to secure connection. Moreover, although it will deteriorate with an Au-Cu alloy if it is used at the elevated temperature of 500 degrees C - 1000 degrees C by the high vacuum of 10-6 to ten to 5 Pa, it is [such no degradation] and is advantageous with a Au-nickel alloy. Moreover, when the whole quantity is made into the 100 weight sections, as for the amount of impurity elements in a Au-nickel alloy, it is desirable that it is under 1 weight section.

[0049] In this invention, a thermocouple can be embedded at a ceramic substrate if needed. It is because the temperature of a heating element can be measured with a thermocouple, voltage and the amount of current can be changed based on the data and temperature can be controlled. The size of the joint grade of the metal wire of a thermocouple is the same as that of the diameter of a strand of each metal wire, or is larger than it, and its 0.5mm or less is good. By such composition, the heat capacity for a joint becomes small and temperature is changed into current value correctly and quickly. For this reason, temperature-control nature improves and the temperature distribution of the heating surface of a wafer become small. As the above-mentioned thermocouple, K type, an R form, B type, S type, E type, J type, and a copper constantan thermocouple are mentioned, for example, so that it may be mentioned to JIS-C -1602 (1980).

[0050] Drawing 8 is the cross section having shown typically the susceptor 11 for installing the wafer prober of this invention of the above composition. The refrigerant diffuser 12 is formed in this susceptor 11, and a refrigerant is blown into it from the refrigerant inlet 14. moreover, the suction mouth 13 to air -- drawing in -- suction -- the silicon wafer (not shown) laid on the wafer prober through the hole 8 is attracted into a slot 7 Drawing 9 (a) is the horizontal sectional view having shown other examples of a susceptor typically, and (b) is a B-B line cross section in the (a) view. As shown in drawing 9 , by this susceptor, many support pillars 15 are formed so that a wafer prober may not curve by press of the circuit tester pin of a probe

card. A susceptor can use an aluminium alloy, stainless steel, etc.
[0051] Next, an example of the manufacture method of the wafer prober of this invention is explained based on the cross section shown in drawing 10 -11.
(1) First, mix the fine particles of ceramics, such as an oxide ceramic, a nitride ceramic, and a carbide ceramic, with a binder and a solvent, and obtain a green sheet 30. As a ceramic powder mentioned above, alumimium nitride, silicon carbide, etc. can be used and sintering acids, such as a yttria, etc. may be added if needed, for example.
[0052] Moreover, as a binder, at least one sort chosen from an acrylic binder, an ethyl cellulose, a butyl cellosolve, and poly BINIRARU is desirable. Furthermore, as a solvent, at least one sort chosen from alpha-TERUPIONE and a glycol is desirable. The paste which mixes these and is obtained is fabricated by the doctor blade method in the shape of a sheet, and a green sheet 30 is produced.
[0053] The crevice embedding the breakthrough which inserts the support pin of a silicon wafer in a green sheet 30 if needed, or a thermocouple can be prepared. A breakthrough and a crevice can be formed by punching etc. The thickness of a green sheet 30 has about 0.1-5 desirablemm.
[0054] Next, guard electrodes and a grand electrode are printed to a green sheet 30. Printing is performed so that a desired aspect ratio may be obtained in consideration of the contraction of a green sheet 30, and this obtains the guard-electrodes printing hand 50 and the grand electrode printing hand 60. A printing hand is formed by printing the conductive paste containing a conductive ceramic, metal particles, etc.
[0055] As a conductive ceramic particle contained during these conductive pastes, the carbide of a tungsten or molybdenum is the optimal. It is the shell to which heat electric conductivity cannot fall easily that it is hard to oxidize. Moreover, as metal particles, a tungsten, molybdenum, platinum, nickel, etc. can be used, for example.
[0056] The mean particle diameter of a conductive ceramic particle and metal particles is 0.1-. 5 micrometers is desirable. Even if these particles are too large and they are too small, they are the shells which cannot print a paste easily. The **-strike which carried out 1.5-10 weight section mixture, and prepared at least one sort of solvents chosen from at least one sort of binders 1.5 chosen from metal particles or the conductive ceramic particle 85 - 97 weight sections, acrylic, an ethyl cellulose, a butyl cellosolve, and poly BINIRARU - 10 weight sections, alpha-TERUPIONE, a glycol, ethyl alcohol, and a butanol as such a paste is the optimal. Furthermore, the hole formed by punching etc. is filled up with an electric conduction paste, and the through hole printing hands 160 and 170 are obtained.
[0057] Next, as shown in drawing 10 (a), the laminating of the green sheet 30 which has printing hands 50 and 60,160,170, and the green sheet 30 which does not have a printing hand is carried out. The laminating of the green sheet 30 which does not have a printing hand is carried out to a heating element formation side for preventing the end face of a through hole being exposed and oxidizing in the case of baking of heating element formation. As long as it calcinates heating element formation, with the end face of a through hole exposed, it is necessary to carry out sputtering of the metals which cannot oxidize easily, such as nickel, and you may cover with the gold solder of Au-nickel still more preferably.
[0058] (2) Next, perform heating and pressurization of a layered product and make a green sheet and an electric conduction paste sinter, as shown in drawing 10 (b). Heating temperature is 1000-2000 degrees C, and pressurization is 100 - 200 kg/cm2. It is desirable and these heating and pressurization are performed under inert gas atmosphere. An argon, nitrogen, etc. can be used as inert gas. Through holes 16 and 17, guard electrodes 5, and the grand electrode 6 are formed at this process.
[0059] (3) Next, as shown in drawing 10 (c), form a slot 7 on the surface of a sintered compact. A slot 7 is formed with a drill, sandblasting, etc.
(4) Next, as shown in drawing 10 (d), print an electric conduction paste on the base of a sintered compact, calcinate this, and produce a heating element 41.
[0060] (5) Next, perform non-electrolyzed nickel plating etc. and form the chuck top conductor layer 2, after carrying out sputtering of titanium, molybdenum, the nickel, etc. to a wafer installation side (slot forming face), as shown in drawing 11 (e). At this time, a protective layer 410 is simultaneously formed also in the front face of a heating element 41 by non-electrolyzed nickel plating etc.
[0061] (6) next, suction penetrated from a slot 7, applying to a rear face as shown in drawing 11 (f) -- form **** 18 for a hole 8 and external terminal strapping At least the part is electric-conduction-ized, and, as for the wall of ****, as for the electric-conduction-ized wall, connecting with guard electrodes, a grand electrode, etc. is desirable.
(7) Finally, put, heat and carry out a reflow of the external terminal pin 191 after printing a soldering paste to the attachment part of heating element 41 front face, as shown in drawing 11 (g). 200-500 degrees C is suitable for heating temperature.
[0062] Moreover, the external terminal 19,190 is formed also in **** 18 through a gold solder. furthermore, the need -- responding -- closed-end -- a hole can be prepared and a thermocouple can be embedded to the interior Solder can use alloys, such as silver-lead and lead-tin and bismuth-tin. In addition, solder layer thickness has desirable 0.1-50 micrometers. It is because it is sufficient range to secure connection by solder.
[0063] In addition, what is necessary is just to print a heating element to a green sheet, when manufacturing the wafer prober 201 (refer to drawing 5), although the wafer prober 101 (refer to drawing 1) was made into the example in the above-mentioned explanation. Moreover, what is necessary is to use a metal plate a ceramic powder, when manufacturing the wafer prober 301 (refer to drawing 6), and to use a metal wire as a heating element as guard electrodes and a grand electrode, to embed, and just to sinter. Furthermore, what is necessary is just to join the Peltier element through a thermal-spraying metal layer, when manufacturing the wafer prober 401 (refer to drawing 7).

[0064]
[Example] Hereafter, this invention is further explained to a detail.
(Example 1) Using the constituent which mixed 53 alcoholic weight sections which consist of the manufacture (1) alumimium-nitride powder (Tokuyama make, 1.1 micrometers of mean particle diameters) 100 weight section, the yttria (0.4 micrometers of mean particle diameters) 4 weight section, the acrylic binder 11.5 weight section, the dispersant 0.5 weight section and 1-butanol, and ethanol of the wafer prober 101 (refer to drawing 1), it fabricated by the doctor blade method and the green sheet with a thickness of 0.47mm was obtained.
[0065] (2) After drying this green sheet at 80 degrees C for 5 hours, the breakthrough for the through holes for connecting with a heating element and an external terminal pin in punching was prepared.
(3) The tungsten-carbide particle 100 weight section of 1 micrometer of mean particle diameters, the acrylic binder 3.0 weight section, alpha-TERUPIONE solvent 3.5 weight, and the dispersant 0.3 weight section were mixed, and it considered as the conductive paste A.
[0066] Moreover, the tungsten particle 100 weight section of 3 micrometers of mean particle diameters, the acrylic binder 1.9 weight section, alpha-TERUPIONE solvent 3.7 weight, and the dispersant 0.2 weight section were mixed, and it considered as the conductive paste B.
[0067] Next, printing printing of the grid-like printing hand 50 for guard electrodes, and the printing hand 60 for grand electrodes was carried out by the screen-stencil which used this conductive paste A for the green sheet. Moreover, the breakthrough for the through holes for connecting with a terminal pin was filled up with the conductive paste B.
[0068] Furthermore, the 50-sheet laminating of the green sheet to which the green sheet and printing which were printed are not carried out is carried out, and they are 130 degrees C and 80 kg/cm2. The layered product was produced by unifying by the pressure (refer to drawing 10 (a)).
[0069] (4) Next, degrease this layered product at 600 degrees C in nitrogen gas for 5 hours, and they are 1890 degrees C and pressure 150 kg/cm2. The hotpress was carried out for 3 hours and the alumimium nitride plate with a thickness of 4mm was obtained. The obtained plate was cut down in the circle configuration with a diameter of 230mm, and was used as the plate made from a ceramic (refer to drawing 10 (b)). The size of through holes 16 and 17 was 3.0mm in the diameter of 3.0mm, and depth. Moreover, the thickness of guard electrodes 5 and the grand electrode 6 was [the formation position of 1.2mm and the grand electrode 6 of 10 micrometers and the formation position of guard electrodes 5] 3.0mm from the wafer installation side from the wafer installation side.
[0070] (5) After grinding the plate obtained above (4) by the diamond grinding stone, the mask was laid and the crevice for a thermocouple (not shown) and the slot 7 (width of face of 0.5mm, a depth of 0.5mm) for silicon wafer adsorption were established in the front face by the blast processing by the glass bead (refer to drawing 10 (c)).
[0071] (6) The heating element 41 was further printed to the field which counters a wafer installation side. Printing used the electric conduction paste. The electric conduction paste used **** chemical research center Solvay strike PS603D currently used for through hole formation of a printed wired board. This electric conduction paste was silver / lead paste, and was a 7.5 weight ****** thing to the silver 100 weight section about the metallic oxide (each weight ratio is 5/55/10/25/5) which consists of a lead oxide, a zinc oxide, a silica, boron oxide, and an alumina. Moreover, the silver configuration was a piece of Lynn-like thing in 4.5 micrometers of mean particle diameters.
[0072] (7) Heating baking of the heater board which printed the electric conduction paste was carried out at 780 degrees C, and while making the silver under electric conduction paste, and lead sinter, it printed on the ceramic substrate 3. The heater board was immersed in the non-electrolyzed nickel-plating bath which consists of solution which furthermore contains nickel-sulfate 30 g/l, way acid 30 g/l, ammonium-chloride 30 g/l, and Rochell salt 60 g/l, and the content of 1 micrometer in thickness and boron deposited 1 or less % of the weight of the nickel layer 410 on the front face of the silver sintered compact 41. Then, the heater board performed annealing processing at 120 degrees C for 3 hours. Thickness was 2.4mm in 5 micrometers and width of face, and the sheet resistivity of the heating element which consists of a silver sintered compact was 7.7mohm/** (drawing 10 (d)).
[0073] (8) The titanium layer, the molybdenum layer, and the nickel layer were formed in the field in which the slot 7 was formed one by one by the sputtering method. simian-virus-4540 by Japan vacuum-technology incorporated company were used for the equipment for sputtering. The conditions of sputtering are the atmospheric pressure of 0.6Pa, the temperature of 100 degrees C, and power 200W, and each metal adjusted sputtering time within the limits of 1 minute from 30 seconds. For the thickness of the obtained film, the picture of an X-ray fluorescence meter to the titanium layer was [2 micrometers and the nickel layer of 0.3 micrometers and the molybdenum layer] 1 micrometer.
[0074] (9) The non-electrolyzed nickel-plating bath which consists of solution containing nickel-sulfate 30 g/l, way acid 30 g/l, ammonium-chloride 30 g/l, and Rochell salt 60 g/l, And a nickel sulfate 250 - 350 g/l, a nickel chloride 40 - 70 g/l, The electrolysis nickel-plating bath adjusted to pH 2.4-4.5 with the sulfuric acid is used including a boric acid 30 - 50 g/l. The ceramic board obtained above (8) was immersed, the content of 7 micrometers in thickness and boron deposited 1 or less % of the weight of the nickel layer on the front face of the metal layer formed of sputtering, and annealing was carried out at 120 degrees C for 3 hours. A heating element front face does not pass current and is not covered with electrolysis nickel plating.
[0075] Furthermore, it was immersed for 1 minute on 93-degree C conditions, and the gilding layer with a thickness of 1 micrometer was formed on the nickel-plating layer 15 at the non-electrolyzed gilding liquid which contains gold-cyanide potassium 2 g/l, ammonium-chloride 75 g/l, sodium-citrate 50 g/l, and sodium hypophosphite 10 g/l on a front face (refer to

drawing 11 (e)).
[0076] (10) air suction which falls out from a slot 7 at the rear face -- the hole 8 was formed by drilling and **** 18 for exposing through holes 16 and 17 further was formed (refer to drawing 10 (f)) Using the gold solder which becomes this **** 18 from a nickel-Au alloy (81.5 % of the weight of Au(s), 18.4 % of the weight of nickel, 0.1 % of the weight of impurities), a heating reflow was carried out at 970 degrees C, and the external terminal pin 19,190 made from covar was connected (refer to drawing 11 (g)). Moreover, the external terminal pin 191 made from covar was formed in the heating element through solder (tin 9/lead 1).
[0077] (11) Next, two or more thermocouples for a temperature control were embedded in the crevice, and the wafer prober heater 101 was obtained.
(12) This wafer prober 101 was combined with the susceptor made from stainless steel which has the cross-section configuration of drawing 8 through the heat insulator 10 which consists of ceramic fiber (tradename [by IBIDEN CO., LTD.] eve wool yarn). This susceptor 11 has the injection nozzle 12 of coolant gas, and can perform the temperature control of the wafer prober 101. Moreover, air is attracted from the suction mouth 13 and a silicon wafer is adsorbed.
[0078] (Example 2) The constituent which mixed 53 alcoholic weight sections which consist of the manufacture (1) alumimium-nitride powder (Tokuyama make, 1.1 micrometers of mean particle diameters) 100 weight section, the yttria (0.4 micrometers of mean particle diameters) 4 weight section, the acrylic BAIDA 11.5 weight section, the dispersant 0.5 weight section and 1-butanol, and ethanol of the wafer prober 201 (refer to drawing 5) was fabricated by the doctor blade method, and the green sheet with a thickness of 0.47mm was obtained.
[0079] (2) After drying this green sheet at 80 degrees C for 5 hours, the breakthrough for the through holes for connecting with a heating element and an external terminal pin in punching was prepared.
(3) The tungsten-carbide particle 100 weight section of 1 micrometer of mean particle diameters, the acrylic binder 3.0 weight section, alpha-TERUPIONE solvent 3.5 weight, and the dispersant 0.3 weight section were mixed, and it considered as the conductive paste A.
[0080] Moreover, the tungsten particle 100 weight section of 3 micrometers of mean particle diameters, the acrylic binder 1.9 weight section, alpha-TERUPIONE solvent 3.7 weight, and the dispersant 0.2 weight section were mixed, and it considered as the conductive paste B.
[0081] Next, the grid-like printing hand for guard electrodes, and the printing hand for grand electrodes were printed by the screen-stencil which used this conductive paste A for the green sheet. Furthermore, the heating element was printed as a concentric circle pattern, as shown in drawing 3 .
[0082] Moreover, the breakthrough for the through holes for connecting with a terminal pin was filled up with the conductive paste B. Furthermore, the 50-sheet laminating of the green sheet to which the green sheet and printing which were printed are not carried out is carried out, and they are 130 degrees C and 80 kg/cm2. It unified by the pressure and the layered product was produced.
[0083] (4) Next, degrease this layered product at 600 degrees C in nitrogen gas for 5 hours, and they are 1890 degrees C and pressure 150 kg/cm2. The hotpress was carried out for 3 hours and the alumimium nitride plate with a thickness of 3mm was obtained. This was started with a diameter of 230mm in the shape of a circle, and it considered as the plate made from a ceramic. The size of a through hole was 3.0mm in the diameter of 2.0mm, and depth. Moreover, for the thickness of guard electrodes 5 and the grand electrode 6, 6 micrometers and the formation position of guard electrodes 5 were [1.4mm and the formation position of a heating element of the formation position of 0.7mm and the grand electrode 6] 2.8mm from the wafer installation side from the wafer installation side from the wafer installation side.
[0084] (5) After grinding the plate obtained above (4) by the diamond grinding stone, the mask was laid and the crevice for a thermocouple (not shown) and the slot 7 (width of face of 0.5mm, a depth of 0.5mm) for silicon wafer adsorption were established in the front face by the blast processing by the glass bead.
[0085] (6) Titanium, molybdenum, and the nickel layer were formed in the field in which the slot 7 was formed in sputtering. simian-virus-4540 by Japan vacuum-technology incorporated company were used for the equipment for sputtering. The conditions of sputtering are the atmospheric pressure of 0.6Pa, the temperature of 100 degrees C, and power 200W, and each metal adjusted the time of sputtering in 30 seconds to 1 minute. For the obtained film, the picture of an X-ray fluorescence meter to titanium was [4 micrometers and the nickel of 0.5 micrometers and molybdenum] 1.5 micrometers.
[0086] (7) The ceramic board 3 obtained by (6) was immersed in the non-electrolyzed nickel-plating bath which consists of solution containing nickel-sulfate 30 g/l, way acid 30 g/l, ammonium-chloride 30 g/l, and Rochell salt 60 g/l, the content of 7 micrometers in thickness and boron deposited 1 or less % of the weight of the nickel layer on the front face of the metal layer formed of sputtering, and annealing was carried out at 120 degrees C for 3 hours.
[0087] Furthermore, it flooded with the non-electrolyzed gilding liquid which becomes a front face from gold-cyanide potassium 2 g/l, ammonium-chloride 75 g/l, sodium-citrate 50 g/l, and sodium hypophosphite 10 g/l for 1 minute on 93-degree C conditions, and the gilding layer with a thickness of 1 micrometer was formed on the nickel-plating layer.
[0088] (8) air suction which falls out from a slot 7 at the rear face -- the hole 8 was formed by drilling and **** 18 for exposing through holes 16 and 17 further was formed Using the gold solder which becomes this **** 18 from a nickel-Au alloy (81.5 % of the weight of Au(s), 18.4 % of the weight of nickel, 0.1 % of the weight of impurities), a heating reflow was carried out at 970 degrees C, and the external terminal pin 19,190 made from covar was connected. The product made from W is sufficient as the external terminal 19,190.

[0089] (9) Two or more thermocouples for a temperature control were embedded in the crevice, and the wafer prober heater 201 was obtained.
(10) This wafer prober 201 was combined with the susceptor with the cross-section configuration of drawing 9 made from stainless steel through the heat insulator 10 which consists of ceramic fiber (IBIDEN CO., LTD. make : tradename eve wool yarn). The support pillar 15 for curvature prevention of a wafer prober is formed in this susceptor 11. Moreover, air is attracted from the suction mouth 13 and a silicon wafer is adsorbed.
[0090] (Example 3) The grid-like electrode was formed by carrying out stamping of the tungsten foil with a manufacture (1) thickness [of the wafer prober 301 (refer to drawing 6)] of 10 micrometers. Grid-like two electrodes (thing used as the ******** guard electrodes 5 and the grand electrode 6) and a tungsten line are put in into a form block with the alumimium nitride powder (Tokuyama make, 1.1 micrometers of mean particle diameters) 100 weight section, and the yttria (0.4 micrometers of mean particle diameters) 4 weight section, and they are 1890 degrees C and pressure 150 kg/cm2 in nitrogen gas. The hotpress was carried out for 3 hours and the alumimium nitride plate with a thickness of 3mm was obtained. This was started with a diameter of 230mm in the shape of a circle, and it considered as the plate.
(2) It laid like the example 1 by carrying out the process of - (10) and obtaining the wafer prober 301 to this plate on the (5) susceptor 11 which showed the wafer prober 301 to drawing 8 of an example 2.
[0091] (Example 4) After carrying out - (10), thermal spraying of the nickel was carried out to the field which counters a wafer installation side further, the Peltier element of lead and a tellurium system was joined after this, the wafer prober 401 was obtained, and it laid like the example 1 on (1) - (5) of the manufacture example 1 of the wafer prober 401 (refer to drawing 7), and the (8) susceptor 11 which showed the wafer prober 401 to drawing 8 .
[0092] (Example 5) The wafer prober was manufactured like the case of an example 3 except the matter or the conditions of indicating a silicon carbide below to manufacture of the wafer prober used as a ceramic substrate. That is, the tungsten line which applied the sol solution which uses the silicon carbide powder 100 weight section of 1.0 micrometers of mean particle diameters, and becomes two grid-like electrodes (thing used as the ******** guard electrodes 5 and the grand electrode 6) and a front face from 10 % of the weight of tetrapod ethoxy silanes, 0.5 % of the weight of hydrochloric acids, and 89.5 % of the weight of water was used, and it calcinated at the temperature of 1900 degrees C. In addition, a sol solution is SiO2 by baking. It becomes and an insulating layer is constituted. Next, the wafer prober 401 obtained in the example 5 was laid on the susceptor 11 shown in drawing 8 like the example 1.
[0093] (Example 6) The wafer prober was manufactured like the case of an example 1 except the process or the conditions of indicating an alumina below to manufacture of the wafer prober used as a ceramic substrate. The constituent which mixed 53 alcoholic weight sections which consist of the alumina powder (Tokuyama make, 1.5 micrometers of mean particle diameters) 100 weight section, the acrylic BAIDA 11.5 weight section, the dispersant 0.5 weight section and a 1-butanol, and ethanol was fabricated using the doctor blade method, and the green sheet with a thickness of 0.5mm was obtained. Moreover, burning temperature was made into 1000 degrees C. Next, the wafer prober obtained in the example 6 was laid on the susceptor 11 shown in drawing 8 like the example 1.
[0094] (Example 7)
(1) Put the tungsten powder of 3 micrometers of mean particle diameters into a disc-like forming fixture, and it is 2 the temperature of 1890 degrees C, and the pressure of 150kg/cm in nitrogen gas. The hotpress was carried out for 3 hours and the porosity CHAP top conductor layer with a diameter [of 200mm] and a thickness of 110 micrometers made from a tungsten was obtained.
[0095] (2) Next, the same process as (1) - (4) and (5) - of an example 1 (7) was carried out, and guard electrodes, the grand electrode, and the ceramic substrate that has a heating element were obtained.
[0096] (3) The porosity CHAP top conductor layer obtained above (1) was laid in the ceramic substrate through the powder of a gold solder (the same thing as (10) of an example 1), and a reflow was carried out at 970 degrees C.
(4) The same process as (10) - (12) of an example 1 was carried out, and the wafer prober was obtained. A chuck top conductor layer and a semiconductor wafer stick to the wafer prober obtained in this example uniformly.
[0097] (Example 1 of comparison) The metal wafer prober which has the structure fundamentally shown in drawing 12 according to the method indicated by JP,3-40947,B was produced. That is, in this wafer prober, with diameter [of 230mm] and a thickness of 20mm copper plate 100B is arranged at chuck top 1B at the diameter of 230mm, stainless steel with a thickness of 15mm, and its lower layer, and is arranged in the lower layer at mica 3B and its pan. Moreover, heating element 4B by the nichrome wire is joined to the bottom of copper plate 100B through mica 3B, and alumina heat-insulation-plate 20B is further joined to the bottom of it through mica 3B. The slot 7 is formed in the chuck top's front face. Next, the wafer prober obtained in the example 1 of comparison was laid on the susceptor 11 shown in drawing 8 like the example 1.
[0098] (Example 2 of comparison) Chuck top 1B produced mica 3B and its metal wafer prober which with a thickness of 1.5mm copper plate 100B is arranged further at the lower layer, and also is constituted like the example 1 of comparison in stainless steel with a thickness of 1.5mm and its lower layer. Next, the wafer prober obtained in the example 2 of comparison was laid on the susceptor 11 shown in drawing 8 like the example 1.
[0099] Performing [on the wafer prober manufactured in the above-mentioned example and the example of comparison which were laid on the evaluation method susceptor, as shown in drawing 12 , laid the silicon wafer W, and] temperature controls, such as heating, the probe card 601 was pressed and the continuity test was performed. Time until it carries out a temperature up to 150 degrees C was measured, respectively at that time. Moreover, 15 kg/cm2 It measured about the amount

of curvatures of the wafer prober at the time of pressing a probe card by the pressure. The amount of curvatures is the KYOCERA CORP. make. The profile and form tester and the tradename "a nano way" were used. In addition, after laying the wafer prober concerning an example 2 in the susceptor in which the support pillar of curvature prevention is formed first, curving and measuring an amount etc., it was laid also on the susceptor shown in drawing 8 in which the support pillar is not formed, and measured the amount of curvatures etc. The result was shown in the following table 1.

[0100]

[Table 1]

	反り量 (μm)	時間 (分)
実施例 1	1	3．0
実施例 2	*1　0．5	2．9
	*2　1	2．8
実施例 3	1．5	3．0
実施例 4	1．5	3．0
実施例 5	2．0	4．0
実施例 6	3．0	7．0
実施例 7	1	2．9
比較例 1	1	15
比較例 2	15	5

注 1）*1：支持柱有り
*2　支持柱無し

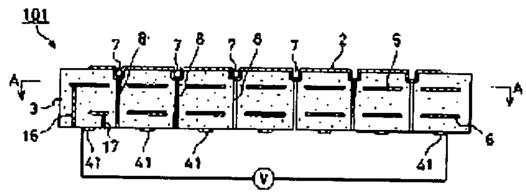
[0101]

[Effect of the Invention] Above, like explanation, moreover, the wafer prober of the invention in this application is lightweight, excellent in the temperature up and the temperature fall property, and when a probe card is pressed, it does not have curvature, and it can prevent breakage and a measurement mistake of a silicon wafer effectively.

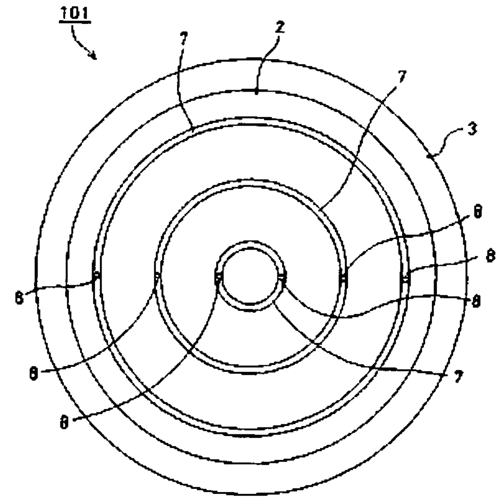
[Translation done.]

４４０　熱電素子
４４１　セラミック基板
＊５１　導体層
＊　５２　導体層非形成部

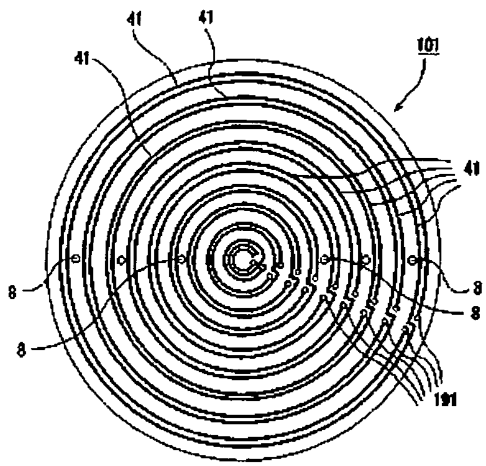
【図１】



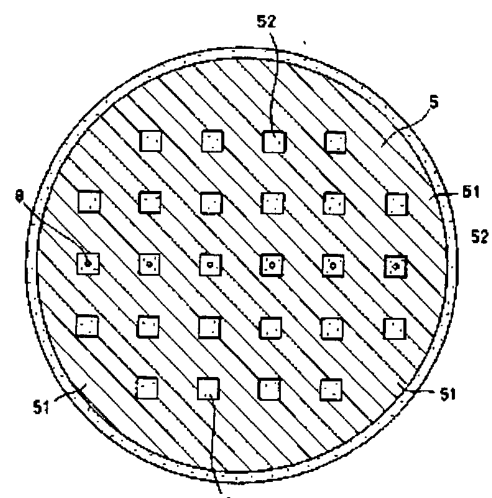
【図２】



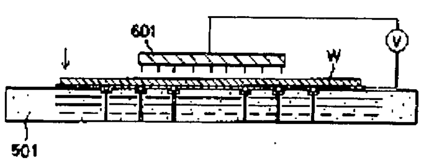
【図３】



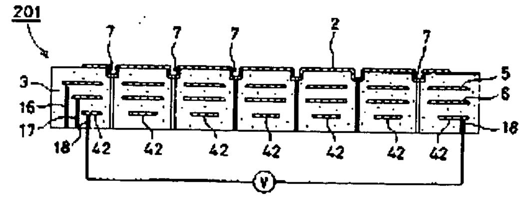
【図４】



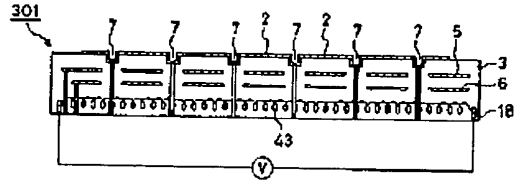
【図１２】



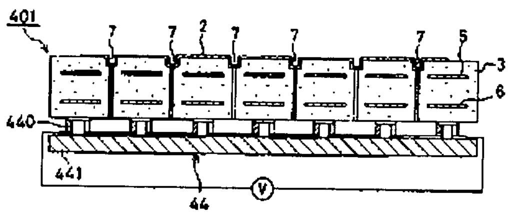
【図5】



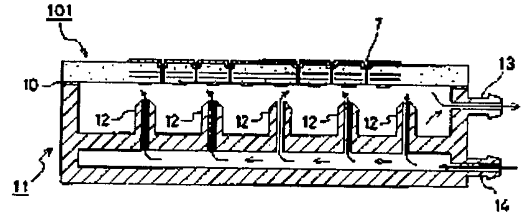
【図6】



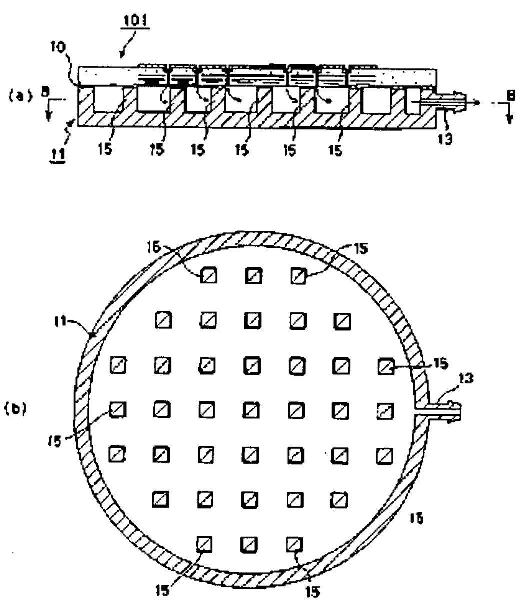
【図7】



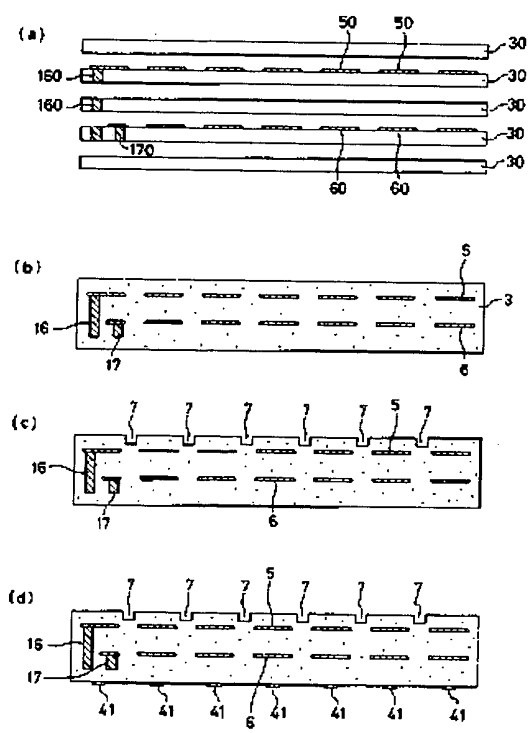
【図8】



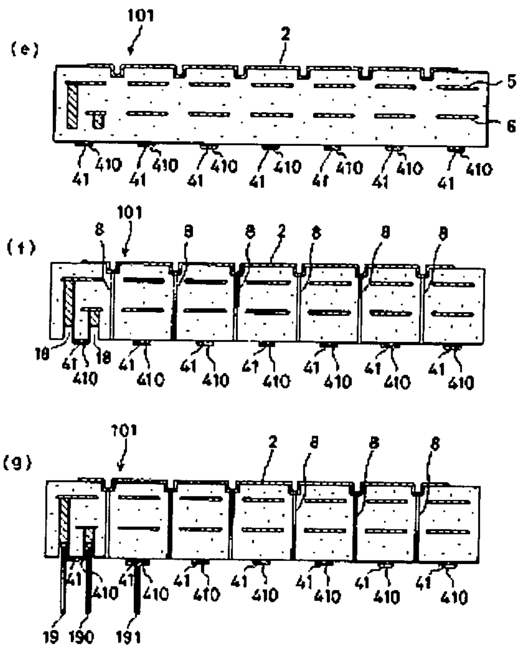
【図9】



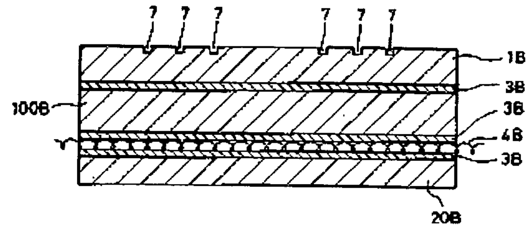
【図10】



【図１１】



【図１３】



【手続補正書】
【提出日】平成１２年９月４日（２０００．９．４）
【手続補正１】
【補正対象書類名】明細書
【補正対象項目名】特許請求の範囲
【補正方法】変更
【補正内容】
【特許請求の範囲】
【請求項１】　セラミック基板の表面に導体層が形成されてなることを特徴とするウエハプローバ。
【請求項２】　前記導体層は、チャックトップ導体層である請求項１記載のウエハプローバ。
【請求項３】　前記セラミック基板には温度制御手段が設けられてなる請求項１または２に記載のウエハプローバ。
【請求項４】　前記セラミック基板は、窒化物セラミック、炭化物セラミックおよび酸化物セラミックに属するセラミックから選ばれる少なくとも１種である請求項１～３のいずれか１に記載のウエハプローバ。
【請求項５】　前記温度制御手段は、ペルチェ素子である請求項３または４に記載のウエハプローバ。
【請求項６】　前記温度制御手段は、発熱体である請求項３または４に記載のウエハプローバ。
【請求項７】　前記セラミック基板中には、少なくとも１層の導体層が形成されてなる請求項１～６のいずれか１に記載のウエハプローバ。
【請求項８】　前記セラミック基板の表面には溝が形成されてなる請求項１～７のいずれか１に記載のウエハプローバ。
【請求項９】　前記セラミック基板の表面には溝が形成され、その溝には、空気の吸引孔が形成されてなる請求項１～８のいずれか１に記載のウエハプローバ。
【請求項１０】　前記導体層は、多孔質体である請求項１に記載のウエハプローバ。
【請求項１１】　その表面に導体層が形成されてなることを特徴とするウエハプローバに使用されるセラミック基板。
【請求項１２】　前記導体層は、チャックトップ導体層である請求項１１に記載のウエハプローバに使用されるセラミック基板。
【請求項１３】　温度制御手段が設けられてなる請求項１１または１２に記載のウエハプローバに使用されるセラミック基板。
【請求項１４】　前記セラミック基板は、窒化物セラミック、炭化物セラミックおよび酸化物セラミックに属す